Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Inquiry Concerning the Deployment of	)	
Advanced Telecommunications	)	
Capability to All Americans in a Reasonable	)	CC Docket No. 98-146
And Timely Fashion, and Possible Steps	)	
To Accelerate Such Deployment	)	
Pursuant to Section 706 of the	)	
Telecommunications Act of 1996	)	

COMMENTS OF INTEL CORPORATION

Summary

Intel Corporation is pleased to comment on this Inquiry concerning the deployment of advanced telecommunications capability. Intel believes that current regulations are unnecessarily undermining the reasonable and timely deployment of broadband and, therefore, the Federal Communications Commission (the Commission) should begin a comprehensive Section 706 rulemaking to review the regulations that apply to all broadband providers.

Under Section 706(a) of the Telecommunications Act of 1996, the Commission is obligated to promote the reasonable and timely deployment of broadband through a variety of regulatory tools.[1] Since "advanced telecommunications capability" includes the ability to transmit and receive video, the Commission's analysis of the status of deployment should consider the availability of high-bandwidth broadband, which is necessary for video content.

[1] See §706(a) of the Telecommunications Act of 1996, Pub. L. 104-104, 110 Stat. 56 (1996) ("1996 Act").

Given the importance of video-rich applications to the development and growth of broadband deployment, the Commission's Section 706 analysis needs to consider the availability of affordable, high-bandwidth broadband to a critical mass of U.S. households in the near term. In particular, the Commission should consider whether multiple providers are deploying advanced telecommunications capability at speeds in excess of 6 Mbps to a majority of U.S. households by the end of 2002.

Despite the potential benefit of widespread, affordable broadband, recent evidence suggests that both the deployment and consumer acceptance of current generation broadband is low and slowing. Even more important, DSL providers have reached an inflection point where they must decide whether to the make substantial new investments in their facilities that would make higher-speed access widely available in the near future.

The current broadband market is competitive and risky, due to reduced access to capital and competing technologies such as cable modem, DSL, satellite, wireless, and dial-up access. Moreover, many financial analysts conclude that the current regulatory climate is further limiting broadband deployment due to infrastructure investment disincentives.

Therefore, Intel believes that the Commission should begin a comprehensive Section 706 rulemaking to review the regulations that apply to all broadband providers in order to encourage the risky and expensive investment in broadband facilities needed to bring high-bandwidth broadband access to the home. Tentatively, the Commission should propose deregulating all new, last mile broadband investment to encourage the fastest possible deployment of the highest speed technology.

I. The Commission is obligated to promote broadband deployment.

Under Section 706, the Federal Communications Commission has a broad and ongoing obligation to promote the deployment of advanced telecommunications capability, which is defined as "high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, *and video telecommunications* using any technology."[2] (emphasis added) In this Inquiry, transmission speeds in excess of 200 kbps in both upstream and downstream directions are defined as "advanced telecommunications capability" and "advanced services."[3] As discussed below, transmission of video requires higher speed access than is available to most households with current generation broadband access.

The Commission has a general obligation under Section 706(a) to encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans …by utilizing, in a manner consistent with the public interest, convenience, and necessity," a variety of tools including "price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment."[4]

Furthermore, under Section 706(b) the Commission must conduct an inquiry to determine "whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion. If the Commission's determination is negative, it shall take immediate action to accelerate deployment of such capability by removing barriers to

[2] See §706(c)(1) of the 1996 Act.
[3] *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996,* CC Docket No. 98-146, Notice of Inquiry, FCC 01-223, ¶ 5 (rel. Aug. 10, 2001) ("Third NOI").
[4] See §706(a) of the 1996 Act.

infrastructure investment and by promoting competition in the telecommunications market."[5] In its first and second inquiries, the Commission concluded that the deployment of advanced telecommunications capability was reasonable and timely on a general, nationwide basis.

In this third inquiry under Section 706, the Commission seeks to re-examine the marketplace to determine whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely manner. Specifically, the Notice makes clear that the Commission seeks comment on how it should utilize various regulatory measures to encourage deployment of advanced telecommunications services.[6]

II. The deployment of advanced telecommunications capability is a multi-dimensional and important goal.

A. Analysis of the state of deployment of advanced telecommunications capability requires consideration of several factors.

Rigorous analysis of the state of deployment of advanced telecommunications capability requires consideration of more than the passby and penetration rates for current generation broadband. In particular, the pace of deployment of broadband depends upon demand-related considerations such as (1) the higher access speeds required by video-rich applications and (2) the need to achieve a critical mass of customers so these applications can become commercially viable. The Commission correctly recognized in the First Report:

> [A]s technologies evolve, the concept of broadband will evolve with it: we may consider today's "broadband" to be narrowband when tomorrow's technologies are deployed and consumer demand for higher bandwidth appears on a large scale. [7]

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[5] See § 706 (b) of the 1996 Act.
[6] *Third NOI,* ¶ 26.
[7] *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the*

First, the true benefits of broadband will require faster transmission speeds than 200 kbps upstream and downstream. Video on demand is likely to be highly valued by consumers. File sharing also promises to transform a gamut of activities ranging from the way in which workers collaborate to the exchange of family photos and videos. Less obvious, but perhaps even more profound, are the likely changes that will occur due to peer-to-peer computing. Users with a PC and adequate bandwidth can exchange files without the costly investment in servers that businesses have had to undertake. But customers must have faster access in order to exploit these possibilities.

Indeed, at only 200 kbps, "advanced services" are not capable of providing adequate transmission speeds for video. As one industry observer stated:

> When video over the Internet first made its debut…it was slow, jerky, grainy and small. For most Internet users today, it's still slow, jerky, grainy and small… Bandwidth, which has quadrupled in the past four years, must continue to grow to accommodate the stringent requirements of streaming video, as well as the increasingly discriminating tastes of viewers in video quality.[8]

For example, high definition video requires 19.8 Mbps; DVD-quality video needs almost 4 Mbps; and even television quality requires 750 kbps or more.[9] In fact, "many experts set 100 Mbps as the frontier [of the Web's true potential for] general surfing to streaming high-quality, skip-free digital audio and video, as well as faster upload of graphic images and larger files."[10]

Second, the true benefits of broadband will require that a critical mass of users have high-bandwidth broadband. Only then will we see the virtuous cycle of innovative applications,

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Telecommunications Act of 1996, CC Docket No. 98-146, Report, FCC 99-5, ¶25 (rel. Feb. 2, 1999) ("*First Report").*

[8] Kira Greene, "Coming eventually: TV on the PC," *Broadcasting & Cable*, 11 December 2000, 88.
[9] Id. at 88.
[10] Consumers Electronics Association, *100 Mbps and Beyond: Bringing Consumers High-Speed Access,* (Arlington: Consumer Electronics Association, 2001) 4-5.

followed closely by increased broadband demand. Indeed, the existence of a substantial core of customers with the capability to affordably purchase the first "killer apps" and the bandwidth to utilize them may be more important to the development and use of broadband than the sheer number of current generation broadband users. High-bandwidth users and applications might well be the impetus that makes broadband access widespread and affordable. When the Personal Computer (PC) was invented, no one foresaw how ubiquitous PCs would become. As PC owners reached critical mass, third-party developers created a host of new applications, which spurred further demand for still faster PCs. Today, more than half of all US households have a PC.[11]

In contrast, we are still nowhere near the 20 million broadband connections that experts say are the bare minimum for critical mass in this new medium.[12] In fact, high-bandwidth residential access is still so rare that analysts have not even created a forecast. [13] Therefore, high passby rates or even penetration growth rates for current generation broadband should not create a sense of complacency.

The opposite is true. U.S. policymakers need to set ambitious national broadband goals against which deployment can be judged. We propose the following long-term and near-term goals:

- By the end of the decade, at least 100 million homes and small businesses should be able to get affordable 100 Mbps broadband capacity.
- By year-end 2002, 80 percent of U.S. homes should be able to get at least 1.5 Mbps capacity and 50 percent of U.S. homes should be able to get 6 Mbps from at least two providers.

[11] US Department of Commerce, *Falling Through the Net: A Report on Americans' Access to Technology Tools* (Washington: US Department of Commerce, 2000), XV.
[12] Louis E. Frenzel, "DSL and Cable Battle For Broadband Supremacy in the Last Mile" *Electronic Design*, 23 July 2001, 58.

B. The likely benefits from widespread, affordable broadband will be enormous.

The benefits from widespread, affordable broadband would likely be enormous. First, the significance of some the markets likely to be affected—shopping, education, commuting, home entertainment and medicine—suggests that broadband could generate enormous benefits. Noted economists Robert Crandall and Chuck Jackson estimate these benefits could easily amount to hundreds of billions of dollars in benefits to U.S. consumers and companies. For example, they note that if broadband improved the efficiency of the retailing/wholesale sector by only a plausible three percent, the annual societal gains would be $58 billion. Similarly, if the increased telecommuting made possible by broadband were to cause even small reductions in traffic congestion, it could generate outsized savings. The added costs from congestion due to the marginal commuter are much higher than those of the median commuter. Reducing busy hour traffic by 1 percent in Atlanta alone would save almost $100 million a year. The potential gains from these and other sectors such as home entertainment, health care, education, and telecommunications are likely to be so great that the net present value to society of accelerating broadband adoption could produce benefits in the hundreds of billions of dollars.[14]

Second, past experience with substantial improvements in infrastructure such as canals, railroad and interstate highways suggests that the benefits from broadband will be larger than we expect and likely result from a myriad of developments we cannot today anticipate. For example, electricity transformed manufacturing by allowing the natural sequencing of operations, Telephones networks changed the ways in which businesses were organized. The railroad:

> [a]ppears as the *sine qua non* of America [sic] economic growth, the prime force behind the westward movement of agriculture, the rise of the corporation, the

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[13] Greene at 88.

[14] Robert W. Crandall and Charles L. Jackson, "The $500 Billion Opportunity: The Potential Economic Benefit of Widespread Diffusion of Broadband Internet Access," (Jul. 2001) ("Crandall and Jackson")

> rapid growth of modern manufacturing industry, the regional location of industry, the pattern of urbanization, and the structure of interregional trade.[15]

More recently, when the first graphical user interface for the Web was developed in 1993, the profound changes that would occur in commerce, industry, and consumer use were inconceivable. In an era where data rather than goods must be transported, widespread, affordable broadband deployment could have the same type of effect.

III. The State of the Broadband Market

A. Current broadband penetration, passby rates, and transmission speeds are discouraging.

Despite the amazing potential of broadband, current penetration, passby rates, and transmission speeds are discouraging. Broadband penetration rates in the United States are at lower levels than projected and growth rates may actually be slowing. By June 30 of this year, 5.5 million subscribers were utilizing cable-modem service;[16] 3.3 million had DSL lines,[17] while satellite and fixed wireless technologies continued to attract a relatively small number of users. Importantly, the growth rate of even current generation broadband is slowing down. The drop in new subscriptions from the first quarter of 2001 to the second quarter has been precipitous: cable modem users fell from 28 percent growth to 16 percent, while DSL fell from 45 percent growth to 12 percent.[18] With US household broadband penetration rate at a mere 9 percent in 2001,[19] we

[15] Jenks as quoted by Robert W. Fogel, "A Quantitative Approach to the Study of Railroads in American Economic Growth: A Report of Some Preliminary Findings," *Journal of Economic History* 22, no. 2 (June 1962): 164 as quoted in Crandall and Jackson.
[16] Ted Hearn, "NCTA Reports Strong New-Service Adds," *Multichannel News,* 20 August 2001, 3.
[17] TeleChoice, *Deployment and Projections* (accessed 18 September 2001); available from http://www.xdsl.com/content/resources/deployment _info.asp; Internet.
[18] Joshua L. Kwan, "Costs, fall of Napster make fast Internet access expendable for many," *Knight-Ridder/Tribune News Service*, 27 August 2001, K2080.

are falling further behind recent projections despite evidence that many narrowband users have expressed an interest in broadband services.[20]

Passby rates for cable and DSL are substantially higher than penetration rates, but questions remain about the validity of these passby numbers and, even if taken at face value, the still relatively slow transmission speeds on which they are based. Passby rates vary greatly by technology. According to one analyst report, service via cable modem is available to 63 percent of US households and DSL is available to 43 percent of total customer locations.[21] "Only about two-thirds of US homes are easily addressable for xDSL."[22] Only one-third of US households can choose between cable and DSL.[23] In the near to intermediate term, competition between cable modems and DSL networks will be crucial to broadband affordability.

Moreover, these passby rates do not address scalability issues. Both cable modem and DSL technologies must resolve "the magnitude of the challenges facing service providers aiming for truly scalable end-to-end provisioning."[24] For example, broadband service via cable-modems may be available to most US households, but as more users in a neighborhood share a single node, transmission speeds fall. Therefore, cable passby rates overestimate the availability of high-speed access.

Most critically, however, transmission speeds available to subscribing and passed households are generally low and vary tremendously. Consider the DSL market. Of the 200 million fixed access lines in the United States, only half are within the necessary proximity to

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[19] eMarketer, "US Household Broadband Penetration,2000-2004," *Econtent*, (September 2001): 17. This slowdown in penetration rates is occurring despite evidence that many narrowband users have expressed an interest in broadband services.
[20] McKinsey & Company and JPMorgan H&Q, *Broadband 2001: A Comprehensive Analysis of Demand, Supply, Economics, and Industry Dynamics in the U.S. Broadband Market* (April 2001), 20. ("McKinsey and Morgan").
[21] Salomon Smith Barney, *The Battle for the High-Speed Data Subscriber: Cable vs. DSL* (August 2001), 2. ("Salomon Smith Barney").
[22] McKinsey and Morgan at 40. ("McKinsey and Morgan")
[23] McKinsey and Morgan at 43.

central offices for optimal data rates of 1.5 Mbps downstream. Furthermore, some central offices have not been equipped with the equipment necessary to provide service due to economic constraints**.** As a result, less than 50 percent of all access lines are capable of receiving DSL at any speed, and an even smaller percentage could receive service at the 1.5 Mbps rate.[25] Transmission speeds are low for most broadband subscribers. Typical downstream speeds for the various technologies are as follows: [26]

- cable: 500 kbps - 1 Mbps;
- ADSL: 384 - 640 kbps;
- fixed wireless: 1 - 2 Mbps; and
- satellite: 400 kbps - 1 Mbps.

As for the long-term goal of 100 Mbps service, we still have a long way to go: only 0.000056 percent of Americans currently enjoy fiber to the home.[27]

In some cases, companies face an investment inflection point regarding the decision to deploy fiber and broadband electronics in the last mile. To get from today's world in which less than half of U.S. households can get DSL service at any speed to a world two years out in which 80 percent could get 1.5 Mbps will likely require the telephone companies to deploy fiber and electronics worth tens of billions of dollars. For example, SBC's Project Pronto requires a $6 billion investment to lay more than 12,000 miles of fiber sheath, equip 1,400 central offices, and install or upgrade 25,000 neighborhood broadband gateways. This program would impact 1/3 of

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[24] McKinsey and Morgan at 57.
[25] RHK 2001 North American XDSL Market Forecast, February 21, 2001 as quoted by DSL Forum, "DSL Anywhere," (accessed 24 September 2001); available from http://www.adsl.com/about_dsl.htm; Internet.
[26] McKinsey and Morgan at 37.
[27] Rob Kirby, "Fiber- Can't Find Its Way Home? – Residences with FTTH enjoy space-age data and entertainment options. Read why yours probably isn't one of them," *Network Magazine* 1 September 2001, 62.

the country's access lines. Eighty percent of SBC's customers would receive downstream speeds of 1.5 Mbps, with more than sixty percent guaranteed transmission rates of 6.0 Mbps.[28]

B. The broadband market is risky and competitive.

Besides demand-side risks discussed above, broadband providers face investment risks, competing technologies and companies, as well as regulatory disincentives and uncertainty. The recent downturn in the economy has resulted in significant changes in the structure of the market. Reduced access to capital markets caused several data CLECs failures. The remaining broadband companies must decide what, when, and where to deploy and their investment decisions will have a dramatic impact on the future of broadband in this country. These decisions will be difficult in face of reduced access to low-cost capital. After growing by 25 percent annually in the late 1990s, telecom investment is down 18 percent this year and is expected to fall another 20 percent next year.[29] Moreover, according to a Lehman Brothers study, "many of the country's largest telecom companies will cut their capital budgets for next year by 20%, to $82 billion from $102 billion in 2001 and $107 billion in 2000."[30]

Cost of capital is crucial because improvements in the transmission speed and availability will require massive infrastructure investment by broadband service providers. An analyst from Bear Stearns & Company believes "the move from narrowband to broadband networking [is] the largest, riskiest and most expensive undertaking the industry could ever attempt to accomplish

[28] SBC Communications, Inc., "SBC Launches $6 Billion Initiative To Transform It Into America's Largest Single Broadband Provider" [News Release] (accessed 17 September 2001); available from www.sbc.com), Internet.
[29] "Free Telecom From Monopoly Shackles," *Business Week*, 17 September 2001, 130.
[30] "Those Wires Sure are Cold," *Business Week,* 17 September 2001, 104.

and a necessary precursor towards next generation services."[31] He estimates that modernizing our wireline access infrastructure could cost as much as $200 billion.

Broadband providers also face competitive risks. The broadband market is dynamic with several competing technologies that are good substitutes. As the Commission has recognized, the relevant market should not be limited to cable modem, DSL or any one other broadband technology. Indeed, cable has a 2:1 advantage in subscribers; its lines pass more households and some analysts contend it has the low cost technology.[32] Even where broadband penetrations are their highest, typically more than 70% of online homes passed by broadband still use dial up.[33]

Lastly, broadband providers, especially the cable and incumbent telephone companies, face regulatory disincentives and uncertainty. Cable companies do not know how the Commission will ultimately regulate cable modem service. While the courts have ruled that local governments do not have jurisdiction to regulate this service, it is not clear whether the Commission will determine that cable modem service is a telecommunications service and, if so, if it will forbear from regulating it.[34] The possible imposition of common carrier regulation may discourage cable companies from providing higher speed broadband service because it might be used by others to compete against cable's multi-channel service.

The most significant regulatory issue is whether Section 251 "unbundling" and other obligations will apply to new broadband facilities deployed by the incumbent telephone companies. For example, extending unbundling regulation to new fiber and remote terminals deployed under SBC's Project Pronto could discourage such new last mile broadband

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[31] Prepared Witness Testimony of Douglas Ashton before the Committee on Energy and Commerce, April 25, 2001.
[32] See, e.g., McKinsey and Morgan at 72 and Salomon Smith Barney at 5.
[33] McKinsey and Morgan at 20.
[34] *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities,* GEN Docket No. 00-185, Notice of Inquiry, FCC 00-355, (rel. Sept. 28, 2000).

investments. If regulation gives the telephone companies a 100 percent of the risk where investments do not pan out and effectively caps the upside return where they prove successful, they will invest more cautiously. Forcing facilities-unbundling will also discourage new competitors from investing in broadband facilities. Who wants to compete against resellers who are renting facilities at forward-looking incremental cost rates calculated using cost of capital estimates for plain old telephone service? Financial analysts are concerned that "regulatory threats, such as the decision in Illinois to require unbundling of xDSL equipment from new remote terminals, could cause further slowing if it sticks or spreads."[35]

IV. Section 706 Analysis

A. Current regulation is undermining the deployment goals of Section 706.

Intel believes that current regulation is unnecessarily undermining the reasonable and timely deployment of broadband. Specifically, based upon the above analysis, we conclude:

- Under Section 706(a), the Commission is required to encourage reasonable and timely deployment of advanced telecommunications capability using a variety of regulatory tools.
- Given the importance of video-rich applications to the development and growth of broadband deployment, the Commission's Section 706 analysis needs to consider the availability of affordable, high-bandwidth broadband to a critical mass of U.S. households in the near term.

[35] McKinsey and Morgan at 10. See also Salomon Smith Barney at 3.; "DSL Connections: High Growth or False Hope?" Arnhold and S. Bleichroeder, Inc. (Aug. 16, 2001), 10.

- The Commission should consider whether multiple facilities broadband providers are deploying high-bandwidth broadband at speeds in excess of 6 Mbps to a majority of U.S. households by the end of 2002.
- While the potential benefit of widespread, affordable high-bandwidth broadband could be enormous, recent evidence suggests that the deployment and consumer acceptance of current generation broadband is low and slowing. DSL providers must make substantial new investments in their facilities if they are going to make higher speed broadband widely available in the next few years.
- At the same time, the current broadband market is competitive and risky. Capital costs have increased significantly in the past year. Cable modem, DSL, satellite and various wireless, and even dial-up access are competing for broadband subscribers.
- Finally, current regulation, particularly unbundling regulation, is a "barrier to infrastructure investment"[36] and the Commission has the ability to utilize regulatory methods to remove these barriers.

B. The Commission should begin a Section 706 rulemaking.

In light of this analysis, Intel believes the Commission should begin a comprehensive Section 706 rulemaking to review the regulations that apply to all broadband providers in order to encourage the risky and expensive investment in broadband facilities needed to bring high-speed Internet access to the home. At this early stage in the development of the broadband market, policy makers should exercise caution to ensure that a competitive and level-playing field can emerge. Many financial analysts agree that current regulations are discouraging

[36] See § 706 (a) of the 1996 Act.

broadband deployment. Consistent with Section 706, the Commission should explore whether Section 10 forbearance, Section 251(d)(2) determinations and the other broad regulatory tools it has at its disposal can be used to promote more rapid deployment of affordable broadband facilities.

This proceeding should consider all broadband alternatives, their different regulatory regimes, and the full panoply of regulatory options. Presumptively, however, the Commission should avoid regulatory intervention unless the rulemaking record demonstrates that consumer interests are being threatened through substantial market or competitive failures. Given the nascent nature of the broadband market, the Commission should tentatively propose deregulating all new, last mile broadband investment to encourage the fastest possible deployment of the highest speed technology. For example, it is premature to require cable companies to make their cable modem facilities available to unaffiliated ISPs at regulated rates. Similarly, new last mile DSL investment should not be encumbered by excessive regulation.

Conclusion

American consumers and high tech companies such as Intel have a lot at stake in how regulators answer the "billion dollar" question on what regulatory rules govern new broadband investment. High tech companies generally "stand in the shoes of consumers": we only benefit if consumers can get and see fit to buy high-bandwidth broadband. High tech companies do not have strong predilections for any specific technology. Nor are we wedded to a preconceived industry structure. We respectfully request the Commission to undertake a comprehensive review of current regulation to assure that all companies that take the risk of deploying new last mile

broadband facilities reap the rewards if they prove successful. The real winner will be the American public.

Respectfully submitted,

INTEL CORPORATION

By: /s/ Peter Pitsch

Peter K. Pitsch
Robinanne J. Stancavage
Intel Government Affairs
1634 I ST, N.W. Suite 300
Washington, DC 20006
(202) 628-3838